MCHB-DC-EW (40)

MEMORANDUM FOR

SUBJECT: Controlling Contamination from Fecal Accidents in Swimming Pools.

1. Enclosed presents guidance from the U.S. Army Center for Health Promotion and Preventive Medicine regarding fecal accidents in swimming pools. This guidance contains recommendations to be used as a response to fecal contamination, as well as precautionary measures.

2. This memorandum acts as an addendum to TB MED 575. Current Army regulations do not address fecal contamination of pools.

3. The points of contact are Mr. John Brokaw or Ms. Sara Renner, DSN 584-3919 or commercial (410) 436-3919.

FOR THE COMMANDER:

Encl

JEFFERY C. SPRINGER, P.E.
MAJ, MS
Program Manager, Water Supply Management

MEMORANDUM FOR RECORD

SUBJECT: Controlling Contamination from Fecal Accidents in Swimming Pools

1. REFERENCES.

a. TB MED 575, 2 July 1993, Occupational and Environmental Health: Swimming Pools and Bathing Facilities.

b. Kebabjian, Richard S., 1995, "Disinfection of Public Pools and Management of Fecal Accidents," Journal of Environmental Health, 58(1):8-12.

c. Centers for Disease Control and Prevention, 1994, "*Cryptosporidium* Infections Associated with Swimming Pools-Dane County, Wisconsin, 1993," MMWR, 43(31):561-563.

d. TM 5-662, 28 February 1986, Swimming Pool Operation and Maintenance.

e. McAnulty, Jeremy M., et al., 1994, "A Community-wide Outbreak of Cryptosporidiosis Associated with Swimming at a Wave Pool," JAMA, 272(20):1597-1600.

f. Sorvillo, Frank J., et al., 1992, "Swimming-Associated Cryptosporidiosis," American Journal of Public Health, 82(5):742-744.

2. PURPOSE. This memorandum provides a set of actions for installations to follow in the event of fecal contamination of a swimming pool.

3. BACKGROUND.

a. Maintaining sanitary water quality in a swimming pool is undoubtedly a difficult challenge. Proper filtration and disinfection of the water are required to provide a safe swimming environment. The TB MED 575 (reference 1.a.) contains guidelines for filtration and disinfection that should be used in minimizing microbiological contamination.

b. Even under optimum conditions, swimming pools can harbor a variety of pathogenic organisms harmful to swimmers, such as bacteria, viruses, and protozoa. Chlorine disinfection controls virtually all the organisms. The protozoan *Cryptosporidium* is an exception. It is a waterborne pathogen that is highly resistant to chlorine, and has a high infectivity rate. Transmission is via the fecal-oral route, and it can be spread from animal to human or human to human.

c. One mode of transmission of cryptosporidiosis is fecal accidents in swimming pools. A number of outbreaks have been reported (reference 1.b.). If the fecal material is contaminated with *Cryptosporidium*, the oocysts (the environmental life-stage) will be released into the water. There is a possibility that swimmers will ingest the contaminated water and contract cryptosporidiosis, a diarrheal illness. Although the illness is self-limited in healthy persons, it has contributed to the deaths of some immunocompromised persons, such as AIDS and chemotherapy patients.

d. It is not practical to maintain the amount of chlorine necessary to inactivate *Cryptosporidium* oocysts (reference 1.c.). The elevated levels would be harmful to swimmers. Therefore, filtration of the pool water becomes the key issue.

4. RECOMMENDATIONS. The U.S. Army Center for Health Promotion and Preventive Medicine provides the following guidelines to reduce the risk of exposure to *Cryptosporidium*, and other pathogenic organisms in the event of a fecal accident. These guidelines are in part suggested by reference 1.b.

a. Evacuate the swimmers and close the pool for the remainder of the day. Notify the supporting Preventive Medicine Service of the incident and provide a roster of the swimmers' names. The roster will be beneficial in notifying the swimmers should any epidemiological concerns arise.

b. Physically remove as much of the contaminant as possible. After removal, clean the equipment and disinfect using a 100 mg/L strength chlorine solution.

c. The pool should remain closed until the filtration system has had at least three turnovers (reference 1.b.). A turnover is when the entire volume of the pool has passed through the filter, usually taking between 6 and 8 hours (reference 1.d.). One turnover provides a turbidity removal of 63 percent, two turnovers gives 86 percent removal, and three turnovers have a 95 percent removal rate (reference 1.a.). Removal of *Cryptosporidium* can be considered part of turbidity removal, since *Cryptosporidium* may be among the particles to be removed from the water. Generally, swimming pools use either rapid sand filters or diatomaceous earth filters. Rapid sand filtration is suspected to be less effective than diatomaceous earth filtration systems in removing *Cryptosporidium* oocysts. In drinking water treatment systems, oocysts are incompletely removed when using rapid sand filtration, even though the water is pretreated (reference 1.e.). Pools can be expected to remove even less since most do not use any pretreatment methods. If a fecal accident occurs at a pool using rapid sand filtration, at least one publication advocates a complete draining to remove *Cryptosporidium* oocysts (reference 1.f.).

d. Following removal of fecal material, superchlorinate the pool to a level of 10 ppm. Measure the chlorine residual not only from the chlorinator, but in the pool as well. This will ensure that the elevated level has been attained. Allow the higher chlorine level to treat the water overnight.

e. The chlorine residual will begin to drop naturally due to dissipation. Prior to opening the pool, measure the chlorine residual to determine that it is within the acceptable operational range. If it is higher than 2.5 ppm, neutralize the excess residual with sodium thiosulfate.

f. Some people may be more prone to accidental contamination. As a preventive measure, post signs restricting diaper-age children, children who are not toilet-trained, and persons with diarrhea from using the pool.

5. The points of contact are Mr. John Brokaw or Ms. Sara Renner, Water Supply Management Program, DSN 584-3919 or commercial (410) 436-3919. For further information on water issues, visit our Web site, at http://chppm-www.apgea.army.mil/dwater.

SARA E. RENNER
Biologist
Water Supply Management Program